UNITED PERFORMANCE METALS
O'NEAL HIGH-PERFORMANCE METALS GROUP

Technical Data

Ferguson Metals, Inc. ◆ Hamilton, Ohio

Nickel-Base Superalloy
Type 625
(UNS Designation N06625)

GENERAL PROPERTIES

Type 625 alloy (UNS Designation NO6625) is an austenitic nickel-base superalloy possessing excellent resistance to oxidation and corrosion over a broad range of corrosive conditions, including jet engine environments and in many other aerospace and chemical process applications. The alloy has outstanding strength and toughness at temperatures ranging from cryogenic temperature to 2000°F (1093°C). Type 625 alloy also has exceptional fatigue resistance.

Type 625 alloy derives its strength from the solid solution strengthening effects of molybdenum and columbium on the nickel-chromium matrix. These elements also contribute to the alloy's outstanding corrosion resistance. Although the alloy was developed for high temperature strength, its highly alloyed composition provides a high level of general corrosion resistance to a wide range of oxidizing and non-oxidizing environments. The levels of chromium and molybdenum provide excellent resistance to chloride ion pitting and the high level of nickel provides resistance to chloride stress corrosion cracking.

The material possesses a high degree of formability and shows better weldability than many highly alloyed nickel base alloys. The alloy is resistant to intergranular corrosion even in the welded condition.

Type 625 alloy is available in plate, sheet and strip. The alloy is supplied in the annealed conditions generally specified.

CHEMICAL COMPOSITION

Typical Analysis

Element	Percent
Carbon	0.010 max
Manganese	0.50 max
Phosphorus	0.015 max
Sulfur	0.015 max
Silicon	0.50 max
Chromium	20 - 23
Nickel	Balance
Molybdenum	8 - 10
Columbium	3.15 - 4.15
Titanium	0.40 max
Aluminum	0.40 max
Iron	5.0 max
Tantalum	0.05 max

RESISTANCE TO CORROSION AND OXIDATION

The high level of chromium and molybdenum in Type 625 alloy provides a high level of pitting and crevice corrosion resistance to chloride contaminated media, such as sea water, neutral salts and brines.

PHYSICAL PROPERTIES

Typical Values/Physical Constants

Density, lb./in.^{3}		0.305
g/cm^3		8.44
Specific Gravity		8.44
Melting Range,	**°F**	2350-2460
	°C	1280-1350
Specific Heat, Btu/lb.	**°F**	0.098
	Joules/kg-°K	410
Magnetic Permeability, 75°F, 200 oersted		1.0006

THERMAL PROPERTIES

Temperature		Linear Coefficients of Thermal Expansion (a) (Units of 10^{-6})		Thermal Conductivity (b)(c)	
°C	°F	/°C	/°F	Btu-ft/ft^2 h-°F	W/m-°K
-157	-250	-	-	4.2	7.3
-129	-200	-	-	4.3	7.4
-73	-100	-	-	4.8	8.3
-18	0	-	-	5.3	9.2
21	70	-	-	5.7	9.9
38	100	-	-	5.8	10.0
93	200	12.8	7.1	6.3	10.7
204	400	13.1	7.3	7.3	12.6
316	600	13.3	7.4	8.2	14.2
427	800	13.7	7.6	9.1	15.7
538	1000	14.0	7.8	10.1	17.5
649	1200	14.8	8.2	11.0	19.0
760	1400	15.3	8.5	12.0	20.8
871	1600	15.8	8.8	13.2	22.8
927	1700	16.2	9.0	-	-
982	1800	-	-	14.6	25.3

(a) Average coefficient from 70°F (21°C) to temperature shown.
(b) Measurements made at Battelle Memorial Institute.
(c) Material annealed 2100°F (1149°C).

ELECTRICAL RESISTIVITY

Temperature		Electrical Resistivity
°C	°F	microhm-cm
21	70	128.9
38	100	129.6
93	200	131.9
204	400	133.9
316	600	134.9
427	800	135.9
538	1000	137.9
649	1200	137.9
760	1400	136.9
871	1600	135.9
982	1800	134.9
1093	2000	133.9

MECHANICAL PROPERTIES

Typical Short Time Tensile Properties as a Function of Temperature

Typical room temperature tensile properties of material annealed at 1920°F (1065°C) follow.

Yield Strength (0.2% Offset)	Ultimate Tensile Strength	Elongation (% in 2")
63,000 psi (430 MPa)	136,000 psi (940 MPa)	51.5%

Data shown are typical, and should not be construed as maximum or minimum values for specification or for final design. Data on any particular piece of material may vary from those shown herein.